Vi lærer om en bæredygtig fremtid

Skoleelever går på universitetet og lærer om klima og energi - SAUCE praksisbrochure

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Learning for a sustainable future

Practical examples of out-of-school activities at universities on energy and climate change

SAUCE Resources Guide

Schools@University for Climate and Energy (SAUCE)

Contents

Introduction

"Our biggest challenge in this new century is to take an idea that seems abstract – sustainable development – and turn it intoa daily reality for all the world's people."

Kofi Annan – former UN Secretary General

How can we generate energy from wind, sun and cow dung? What exactly are greenhouse gases, and what have they got to do with the temperature on earth? How can I protect the climate while saving energy (and money)? What is the correlation between my breakfast, energy, and climate protection, and how do I get sunshine into my car's fuel tank? These and many other interesting questions about day-to-day issues as they relate to energy and climate change are the focus of the EU-funded "Schools at University for Climate and Energy" project, SAUCE.
For the SAUCE project, children aged between 10 and 13, together with their teachers, were invited to the campuses of seven universities in Austria, Denmark, Germany, Latvia, the Netherlands and the United Kingdom. These unique learning environments have given these children the opportunity to gain knowledge and experience about energy and climate change.

All programmes in the project adopt an interdisciplinary approach, and provide a range of hands-on activities to encourage learning. The universities and local partners developed scientific experiments involving renewable energies, on-campus "energy tours", creative writing workshops, and art and theatre activities, as well as management and climate change role plays. Children learned about energy awareness in an entertaining, non-patronising way. The SAUCE project's programmes were adapted to the unique culture and context of each university as well as that country's educational policy.

We have drafted this brochure to supplement the SAUCE Handbook, to give an idea of the contents of these flexible and highly adaptable programmes, and with the aim of inspiring others to develop their own activities. We hope this brochure will give an idea of the wide range of activities used in the SAUCE project. The nine examples in this guide were selected by the seven universities working with the programme. They demonstrate a range of successful topics and strategies that can be used to teach the complex issues of energy and climate change in an age-appropriate way.

We hope you enjoy reading this brochure, and that you will be encouraged to discover new strategies for education on energy and climate change.

Lutz Mez, SAUCE coordinator,
Karola Braun-Wanke, SAUCE Programme Development

The SAUCE European partners are:

- Vienna University of Technology, Austria
- Aalborg University, Denmark
- Roskilde University, Denmark
- Freie Universität Berlin, Germany
- Berlin Energy Agency, Germany
- University of Latvia, Latvia
- University of Twente, The Netherlands
- London Metropolitan University, United Kingdom

www.schools-at-university.eu

We negotiate the network of life. A student simulates an international conference with the schoolchildren.

Opening up universities: Promoting knowledge and skills on energy and climate change

Climate change presents a major challenge, both locally and globally, particularly for those future generations that make up the youth of today. For this reason it is extremely important that this issue becomes part of the regular school syllabus. The seven partner universities of the SAUCE project came together to address current shortfalls in knowledge and teaching on the key issues of sustainable development, energy and climate change in schools throughout the European Union.

In the SAUCE project individual scientists from seven European universities initiated a new approach: They opened up their universities' premises as venues for the education of a new and young target group. This supported transfer of knowledge and skills and provided an opportunity for exploring new ways of communication in science. Since 2008 these universities and their staff have produced interactive events on energy and climate change, under the auspices of the SAUCE project. In well-equipped lecture halls, workshop rooms, laboratories and gardens (as well as on roofs with solar installations), scientists turned the complex subjects of energy and climate change into tangible experiences for children and teachers. Over the course of three years' intense shared experience, the SAUCE concept developed into a fully-fledged European programme format with more than 19,000 children participating from all over Europe. Roughly 35,000 seats in workshops and lectures were filled.

Through the SAUCE project the universities involved actively contributed to societal change and the promotion of a sustainable, secure and fair policy on energy and environmental protection.

Facts and Figures

Since 2009, SAUCE programmes have held a total of 1,000 sessions in six European countries. These sessions were attended by 19,000 pupils and 1,250 teachers many of whom attended two workshops or lectures, filling a total of 35,000 seats.

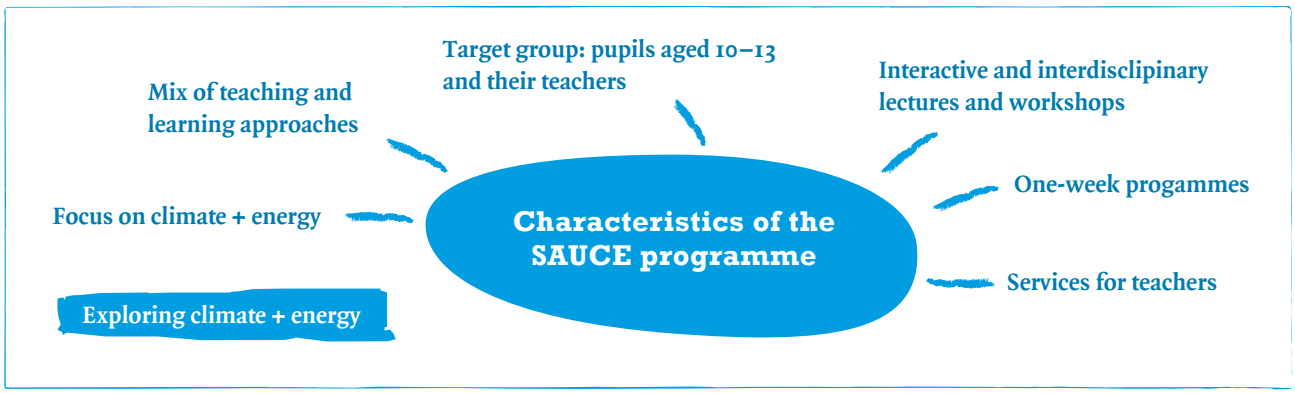
What is SAUCE?

"SAUCE" refers to the concept of taking groups of children, together with their teachers, into universities in order to provide them with practical knowledge about energy and climate change, as well as introducing them to initiatives and solutions on climate protection. This idea is based on the successful model of the "children's university" – an idea that has become a common feature at many European universities.

Further information on "children's universities" is available at www.eucu.net

PaperEnergy workshop: Pupils follow the path from tree to paper to uncover the hidden uses of energy and other resources in the paper-making process.

- SAUCE programmes are aimed at 10-13-year-olds. This is because the issues of energy and climate change have traditionally been insufficiently covered in educational syllabuses and teaching materials for this age-group. Moreover, children of this age group are (in terms of developmental psychology) mature enough to understand, as well as sufficiently open to, and inquisitive about, environmental issues.
- Teachers are also offered support to encourage further teaching and deepening of knowledge after participating in a SAUCE event. When possible, teachers are able to participate in informative events on campus and to become acquainted with teaching materials, experiments, and with ideas for inter-disciplinary projects dealing with energy and climate change. They are given the opportunity to make contact with university staff and energy education professionals.



What do SAUCE events offer?

SAUCE events offer hands-on, experience-led workshops and lectures on energy and climate change. Over the course of a week the universities involved provide a comprehensive programme of between 25 and 50 activities, some of them run simultaneously. Depending on the scale of any particular programme between 1,000 and 2,500 children may participate.

An important feature of all SAUCE programmes is their interdisciplinary approach, dealing with the scientific, technological, social and cultural aspects of climate change, renewable energies and energy efficiency. All events are adapted as appropriate to the ages of the children and to relate to their everyday lives.

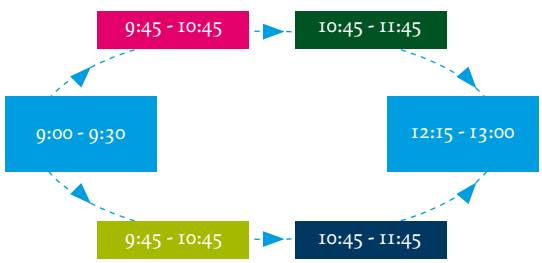
Closed or open SAUCE programme format?

The SAUCE programme is flexible and adaptable to practically any context. Taking into account their university's research focus and the local education system, SAUCE partners developed and successfully tested two basic programme formats:

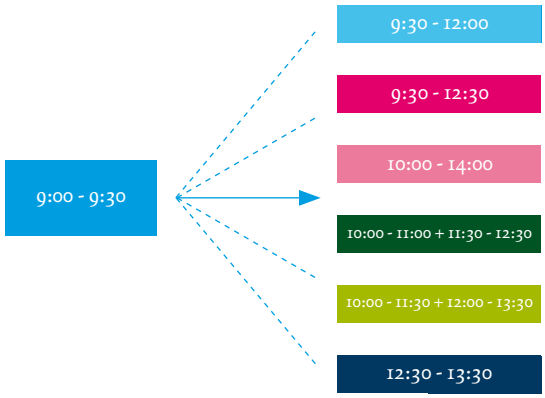
- An **"open-campus" format**, which allows participating schools to select individual lectures or workshops and freely choose the thematic focus. This format is suitable for larger cities with great demand by schools, efficient public transport, and open campuses that allow quick and easy access.
- A **"closed-cycle" programme** over the equivalent of a school day, usually with a plenary opening event (e. g., a science demonstration), followed by smaller, parallel workshops and finishing with another plenary event or feedback session.

In practice of SAUCE, individual elements from both programme formats were easily combined.

"closed-cycle" programme



"open-campus" format



SAUCE in practice: Some programme highlights

From abstract theory to hands-on practical experience

When initiating a programme, university staff and scientists must first answer the core question of which methods are most appropriate for teaching the often abstract and complex issues of energy and climate change in a university context:

- How can we make young people think about changing their attitudes to energy, in terms of their personal lives as well as in terms of policy?
- How can we make people interested in what is often perceived as a "boring" topic, and one that is often presented in a negative context – frequently covered by the media only in the context of natural disasters and catastrophes?
- How can we make people feel responsible for the future, without them feeling patronised?

Teaching SAUCE concepts at university: keynotes for success

- Take children seriously and do not underestimate the knowledge and competences they have.
- Present knowledge, facts and figures through funny, personal stories, combined with hands-on activities.
- Present information and knowledge by means of images and personal experience.
- Involve children and let them play an active role.
- Let children have a look "behind the scenes" at energy-related facilities on campus and around it.
- Disseminate positive "can do"-messages.
- Let children discover concrete, tangible initiatives and solutions that they will remember and take home.

Age-appropriate teaching based on real-life experience

The objective of all individual programme elements of the SAUCE project is to make children aware of the role energy plays in their current lifestyles and consumption – that is, in relation to their clothing, nutrition, mobility, hobbies, or to architecture and product design, for example.

Through direct, hands-on experience – including, for example, by making things, taking part in a "climate breakfast", working out one's ecological footprint or discovering energy installations on a tour of a campus – children are given the opportunity to appreciate the key issues of sustainable development for themselves, using all five senses and investigating potential solutions and opportunities for action. Since the programme adopts an interdisciplinary approach it can address issues not only from ecological and scientific, but also from social, socio-political, local, national and global perspectives.

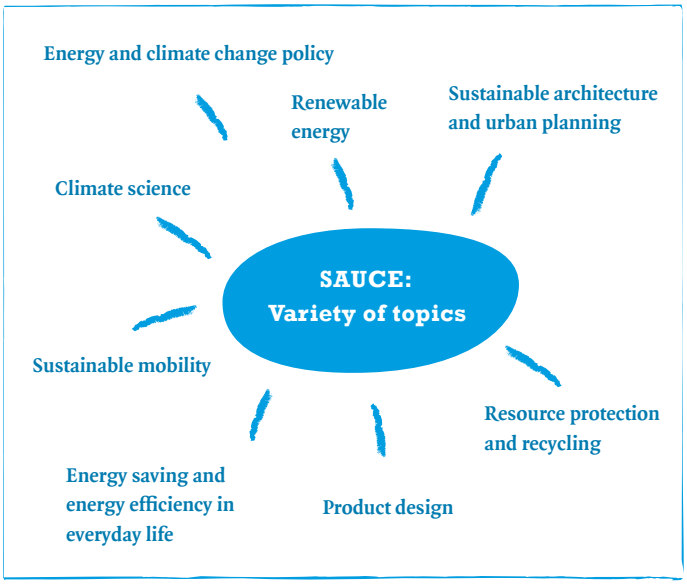
All SAUCE programmes combine facts, background knowledge, and supplementary knowledge and information, as well as examine the relationships between cause and effect and combine these with practical, hands-on activities. The universities involved in the project have implemented this approach in a range of situations including:

- scientific experiments on renewable energies (wind, water, bio-mass, solar) in research laboratories;
- workshops on renewable energy technologies (e.g., fuel cells, wind power generators, solar-panels, bio-mass reactors);
- excursions and workshops – for instance at an ecological farm, at a local textile recycling factory, at a weather station, at a botanical garden, and at a local power station;
- tours to energy-related facilities on campus;
- art, theatre and dance activities dealing with recycling, resource conservation and sustainable living; and
- quizzes, interactive lectures and knowledge games examining various issues, including "What is energy?" and the causes and effects of climate change.

Examples of SAUCE topics

The nine examples given below demonstrate how the crucial issues of energy and climate change can be brought to life through interactive workshops and lectures. They illustrate how the following five core topics of the SAUCE programmes can be implemented. With some minor modifications they have been used by all participating universities.

- Learning about renewable energies
- Education through games and role plays
- Conserving energy at home and at school
- Sustainable consumption and lifestyle
- Energy-efficient design and construction



A hands-on, interactive workshop

My motor runs on hydrogen! How to make a climate-friendly car

Petrol and diesel are fossil fuels that place a considerable burden on our climate, our environment and our health. Aren't there any climate-friendly alternatives? What will such cars look like? How efficient are their engines?

In this hands-on, interactive workshop, small groups of children learn how a hydrogen-fuel-cell model car is assembled. Using the kit provided, together with a fuel cell, each group assembles their own energy-efficient model car – with an endurance test at the end of the session. The winner is the car that goes the furthest on one charge of liquid hydrogen.

Duration: One hour.
Educators: Environmental professionals from Arcola Energy, London.

Method: Creative and experimental model making.

Introduction: The children are introduced to the advantages of alternative and renewable technologies for motor vehicles - in particular, fuel cells. Environmentally friendly modes of movement (e.g., walking and cycling) will also be discussed – that is, ones that constitute a deliberate "deceleration" while contributing to climate protection and a better quality of life. The workshop also addresses typical anxieties and reservations (e.g., regarding costs), ones which many consumers have in respect to such alternative technologies. This workshop gives children the opportunity to get involved directly in learning about the principles of building a model car, and to gain first-hand experience of the technical relationships between the gearbox, the weight of the car, the quality of design, as well as the materials. Assembling the model car rouses their interest and curiosity in searching for technical solutions; at the same time, an interest in renewable energies is promoted.

Group activity: The children are divided into small groups of four or five. Each group is given a kit (with differing wheel sizes, engine capacities, chassis, fuel cells, etc.) from which they assemble their own model car. While they are encouraged to ask questions, the children build their cars without relying on constant assistance from the workshop tutors. The cars will then be filled (with five millilitres of hydrogen) and their efficiency tested through a series of trial runs, and the children have an opportunity to optimise their car's efficiency after each trial run. The objective of this session is to encourage each group to improve the efficiency of its design, to discard inefficient solutions, and to learn how not to be disheartened by setbacks.

Reflection: In a final plenary session, the children are encouraged to discuss their impressions and experiences. The questions will focus upon the following issues: what was the greatest challenge for you? Why? How did you find working in a team? How many trial runs did you do? Did the car become more efficient with each run? Did you have fun?
The plenary session considers the extent to which innovative technologies provide solutions for climate protection, how feasible they are, and the extent to which changes in one's own behaviour can contribute to climate protection and sustainable mobility, e.g. walking, cycling and using public transport more often and flying less. The children have the opportunity to debate the 'technical fix' approach to climate problems.

Objective

The purpose of this workshop is to generate enthusiasm for renewable energies, to encourage greater awareness of potential alternatives in automotive engineering, and to deliver a practical understanding of the relationship between climate-friendly technologies and energy efficiency.

The children are shown the various ways a fuel cell functions:
- How it can be used for locomotion;
- How it can provide a climate-friendly alternative to fossil fuels such as petrol and diesel (assuming the hydrogen is produced in an environmentally friendly way);
- How it can be used to store energy.

By using a creative and interactive "trial and error" approach, one that encourages fun, curiosity and the joy of discovery, the children begin to recognise how technological and behavioural innovations can be developed. They also get to know something about engineering, before choosing between arts and science subjects for secondary study. This should widen their horizons and enhance their career prospects.

Which car provides the most efficient transport? By assembling and testing out, the children discover how a fuel-cell-powered car works.

Subjects

Sustainable mobility; the role of hydrogen in low-carbon mobility; renewable energies (fuel cell) as alternatives to fossil fuels; the uncertainties about which fuels will be adopted successfully

Interactive lecture

Energy from nature – and the bio-waste bin!

Bio-energy (any energy generated from biomass) is the "all-rounder" of the renewable energies. Bio-energy can be liquid, gaseous or solid; and it can be stored. Yet, how do we generate electricity from the contents of the bio-waste bin, fuel from rapeseed, or heat from wood? Doesn't the energy from chicken slurry stink to high heaven? And doesn't bio-energy actually decimate our rain forests? Do people in poorer countries have to go hungry because we want to fill our cars' fuel tanks with bio-fuels?

Duration: One hour
Educators: Engineers from Reiner Lemoine Institut GmbH and from the Verein für Integration von Technik und Organismus - VITOS e.V.

Method: Interactive lecture with roundtable discussion.

Introduction: Two presenters lead the interactive lecture, one a farmer wearing Wellingtons and green work clothing, the other a female scientist. "Farmer Bruno" introduces himself to the children and explains that a farmer can produce not only potatoes and eggs, but also "energy". In an entertaining manner the two lecturers present photos of wood, straw, rapeseed and sugar beet. During a "question and answer" game, they invite the children to guess which of these organic substances could be used to generate energy.

Expert panel: Four children are invited to volunteer to sit on an "expert panel". The female scientist gives them solid organic materials — dried cowpats, mash, straw, hay, and bark from trees, which Bruno has brought with him from his farm. The children study these materials on the basis of scientific criteria and by "smelling, touching and tasting," in order to identify the substances and decide which could be used for energy generation. Large images of each material are projected onto a screen, thus enabling the audience to follow the entire process.

Slideshow: The "expert panel" is followed by another slideshow that features photos of bio-energy facilities of varying sizes. These facilities process (or ferment) either bio-mass or wastes (such as chicken slurry or crop residue) for biogas production which, in turn, is converted to electricity and heat by combined heat- and power stations (co-generation plants). The female scientist briefly explains how these systems work.

Expert panel: Farmer Bruno convenes the second expert panel, inviting the "experts" to identify and assess other species of grains and solid organic materials. These are passed around to audience members.

Discussion: After this session, the two presenters use photos to discuss the pros and cons of bio-energy. For instance, do the monocultures of energy-plants destroy meadows, pastures and rain forests, and do they actually cause price spikes (of food or farmland) which, as a result, have negative consequences for world hunger? Is bio-energy the panacea for all energy issues – i.e., the ideal source for all electricity, heat and fuel in the future?

Reflection: Farmer Bruno asks the children to discuss amongst themselves the pros and cons of bio-energy. Some children are invited to present their impressions as well as the results of these "private" discussions to the entire audience.

Objective

The children are introduced to various solid organic substances and grain types that can be used for energy generation. Through direct contact (i.e., through hands-on contact and a quiz) they learn that bio-energy is a renewable energy generated from biomass. They are shown that the materials brought by the farmer (e.g., wood, straw, maize, rapeseed, sugar beet, garden and kitchen waste, as well as animal excrement) can be converted into electricity, heat and fuels at special bio-energy plants.

What is that funny smell?! Cowpats in the lecture hall!
- Farmer Bruno explains entertainingly what bio-energy is.

Subjects

Producing heat and electricity from bio-mass; advantages and disadvantages of growing energy crops; methods of scientific analysis

Experience and hands-on workshop

When the surf's up: Ocean waves as the power stations of the future

How can we turn the energy of ocean waves into consumable electricity – and how much energy will be made available as a result? Using the university's ocean wave laboratory we discover how much energy is contained within an ocean wave, and how this energy might be used.

Duration: One hour
Educators: University lecturers (PhD students) and engineers of the Institute of Civil Engineering, Aalborg University

Method: By experiencing energy in the university's ocean wave laboratory.

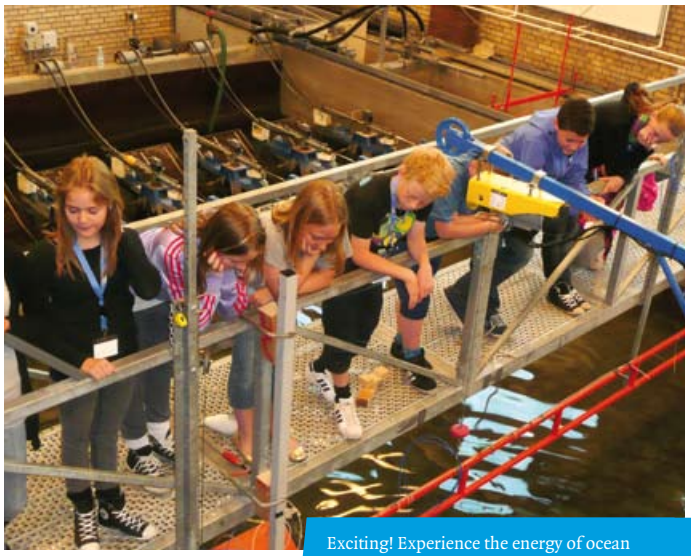
Objective

The objective of this workshop is to demonstrate how a wave power station works and how the energy of ocean waves can be used to generate electricity. From the measurements they take - in addition to their experience in the tank -, the children learn that the use of wave power is a realistic and exciting form of energy generation, one that is both renewable and sustainable.

Introduction: Standing directly in front of the laboratory's wave generator, a young PhD student provides an introduction to this session by addressing the following questions: what is energy? How much energy is contained in wood, coal or chocolate? How much energy is contained in an ocean wave, and can we generate waves artificially to use them systematically for energy generation?

Hands-on activity: The lecturer explains how water power can be converted into energy and why water power is categorised as a regenerative energy source. Following this brief introduction, the children imitate the typical up-and-down movements of waves by pretending to be waves themselves. After this theoretical and physical "warm-up", the children are taken on a guided tour of the laboratory.

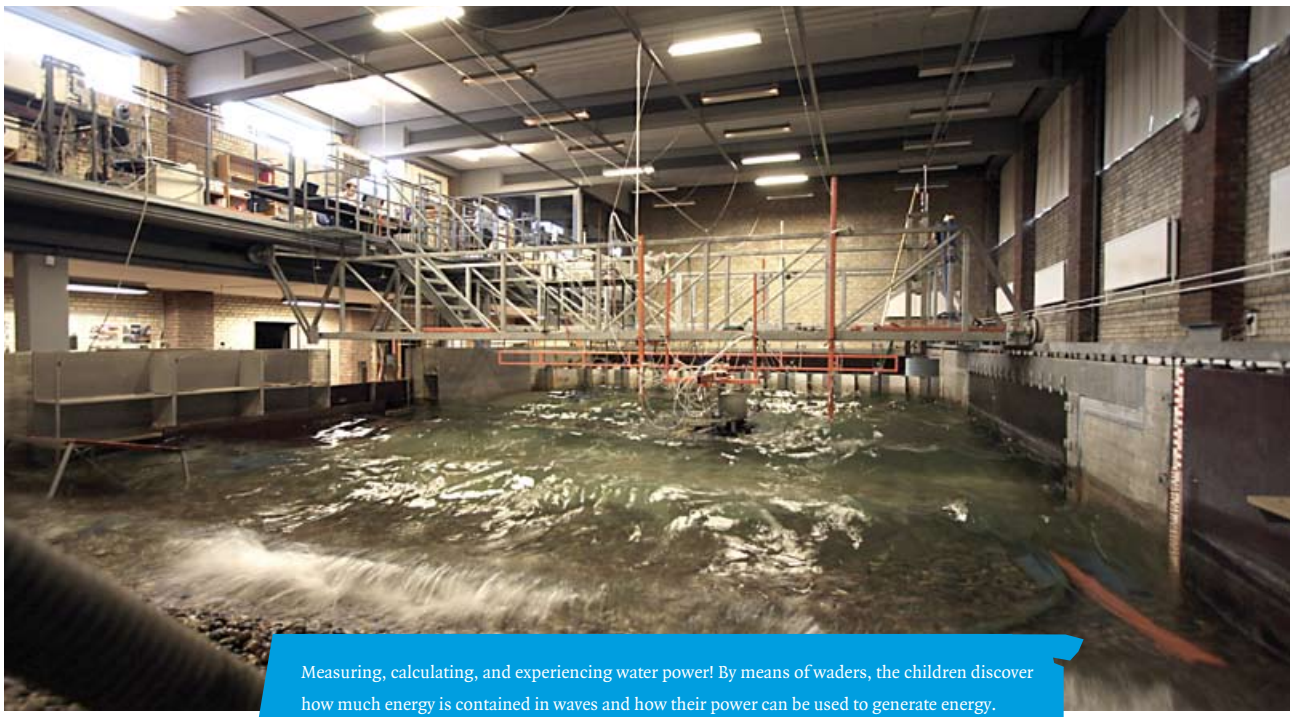
The lecturer explains how the energy of a wave can be measured, and what parameters are used in measuring this energy. He/she asks the children to undertake such measurements themselves. The children enter the tank wearing waders and measure the water level. After the wave generator is switched on, they measure the height of the waves, also noting the length of the pauses between each wave. The complete data is entered into a specially designed form and collectively evaluated.



Exciting! Experience the energy of ocean waves in a research lab.

Subjects

Causes and effects of climate change; renewable energies (e.g., water power).



Measuring, calculating, and experiencing water power! By means of waders, the children discover how much energy is contained in waves and how their power can be used to generate energy.

Warm up: The children imitate an ocean wave.

Hands-on workshop and education through play

We are the Climate Checkers!

Why do adults constantly talk about "climate protection", "sustainability" and "energy conservation"? What do they mean by these things exactly? Does one first understand these concepts when one becomes an adult? Hopefully not! This session attempts to get to the root of these issues and, by means of interviews, hopes to find out how much the adults themselves actually know about these issues. Finally, a short quiz on the environment provides the opportunity for everyone to learn something!

Duration: Three hours
Educators: Scientists from the Institut für Energiesysteme und Elektrische Antriebe (Energy Economics Group, Institute of Power Systems and Energy Economics, Vienna University of Technology)

Method: Experience and play-led hands-on activity and training in communication skills.

Introduction: After a short introductory game, the children are invited to form groups (of five to seven) and to gather around various posters, which are on the ground. Pens are available. Any associations that come to the children's minds are collected using keywords – including wind, energy, crude oil and climate change. Subject clusters are established and the groups discuss the most striking associations. Interactive discussions and explanations on diverse topics follow - amongst these are renewable energies, fossil fuel energy sources, the greenhouse effect and the environment.

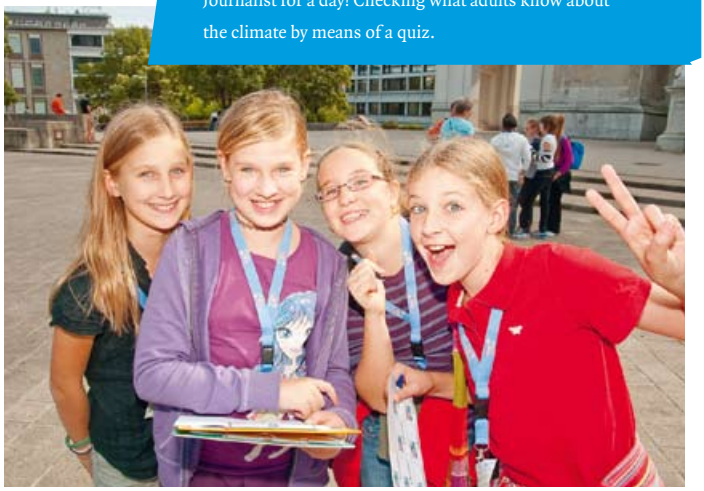
Field study: After a brief introduction that deals with behaviour and personal safety rules regarding street interview conduct, communication and interviewing techniques using the "ball-bearing method" are presented. Using group-training methodology, the children are asked to sit or stand in pairs, facing each other. This gives them the opportunity to practice simple communication techniques that they in turn can use with passers-by on the street. The children leave the university building in groups of three. Each group is given a clipboard with a list of questions and stickers reading "Climate Checked!" The children's task is to address adult pedestrians and to subject them to a short "energy and climate quiz". Do the adults know about the causes and consequences of climate change? How much do they know about their own day-to-day energy consumption and CO_2 emissions? How do expert opinions, studies, and warnings from scientists, researchers and politicians influence their attitudes and views? Those adults that participate are presented with a "Climate Checked!" sticker as a token of gratification.

Reflection: Later in the plenary, the children have the opportunity to share their experiences and interview results. If necessary, further discussion ensues; and any lingering questions are answered.

Objective

This workshop offers young people the opportunity to assume the role of journalists. The presumably advanced knowledge of the adults is put to test – this, by means of posing unconventional questions in a manner which simultaneously satisfies the children's curiosity and let's them have fun. Discussion on energy and climate is stimulated between the interviewers and the interviewed. The children ask others about their views, opinions and knowledge. The children learn how they can get involved in politics and society by asking simple questions.

Journalist for a day! Checking what adults know about the climate by means of a quiz.



Traning: By means of a game the children practice taking street interviews.

Subjects

Causes and effects of climate change; reflections on lifestyle and energy consumption; practical experience of journalism and the role of multipliers.

Interactive lecture

Energy quiz: How can I conserve energy, save money and protect the environment at the same time?

What is energy, how is it generated, and how does it reach the socket to be used by consumers? What are fossil fuels and renewable energy sources? What are the key characteristics of a climate-friendly energy supply? How can we conserve energy and even save money there-with in our day-to-day lives? Guess along and discover how saving energy at home can actually be fun!

Duration: One-and-a-half hours
Educators: Scientists and employees from the Department of Environmental, Social and Spatial Change, Roskilde University

Method: Interactive lecture and quiz to educate children about energy.

Introduction: By dealing with a few fundamental questions - "what is energy; how is energy generated; how does it reach consumers' sockets; what are fossil and renewable energy sources?" -, children are given a brief introduction into the ways in which energy consumption correlates to climate change, and the ways in which consumers and/or children can help prevent climate change and protect the environment – this, through changes in their own behaviour as well as through measures to improve energy efficiency. Using pictures and imagery, a short film depicts the components of a typical local energy supply system in Denmark and outlines potential initiatives and solutions the children can pursue for protecting the climate in everyday life.

Quiz: In the second part of this session, yellow and red cards are distributed. Questions regarding those subjects previously outlined are posed in a fun quiz. They will deal with issues such as which measures can be taken to conserve energy at home and at work. The lecturer writes two proposals (one in red and one in yellow chalk) on the blackboard, and the children are asked to raise their red or yellow cards to show which they think is correct. "Correct" answers are discussed in terms of how each proposal can be integrated into everyday life.

Reflection: The session's quiz elements. as well as the common search for feasible proposals, raise climate protection awareness and encourage the children to incorporate various aspects of this into their day-to-day lives.

Objective

This interactive lecture endeavours to show children in a playful way how they can conserve energy; it encourages them to adopt energy-efficient and climate-friendly behaviour in their everyday lives. The children learn how to act in a climate-friendly manner without compromising comfort or quality of life.

Subjects

Causes and effects of climate change; the correlation between energy consumption and climate change; proposals for action and solutions at school, in the workplace, and in everyday life; tips for conserving energy

Energy can be really exciting!

Quiz in the lecture hall! In this lecture, the children discover how energy can be generated and how people can save money by conserving energy.

Experience and hands-on workshop

Climate breakfast: What does my breakfast have to do with climate change?

Grapes, strawberries, jam from South Africa or Chile, local meats and butter, cheese from Switzerland and apples from South Tyrol? Our breakfast is full of energy! And not just the energy we eat, but, in particular, the energy that is consumed in producing, transporting and providing the food, as well as disposing of waste. The project session entitled "Climate breakfast: what does my breakfast have to do with climate change?" takes a very practical approach by having breakfast at an organic farm. In the process we discover where our food actually comes from, and how our food relates to climate protection.

Duration: One-and-a-half hours
Educators: Scientists of the Twente Centre for Studies in Technology and Sustainable Development, University of Twente, and representatives from an ecological farm, Zorgboerderij Viermarken.

Method: Learning with the five senses: an excursion with a "climate breakfast" to an ecological farm.

Introduction: The excursion to the Zorgboerderij Viermarken farm begins with a brief lecture on food production. It outlines key criteria relating to ecological farming and animal husbandry, and compares these with conventional farming methods and intensive animal husbandry. Knowledge is imparted through games and quizzes, with the children taking an active role, asking questions about the origin of food as well as the correlation between climate change and nutrition. The children receive a guided tour of the farm where they are shown a chicken coop, a pigsty, greenhouses, and fields in which crops are grown and animals kept – all in accordance with ecological principles.

Climate breakfast: The children meet for a buffet breakfast where they can serve themselves, choosing from a) local, seasonal and organically produced food; and ii) food imported from all over the world. The breakfast lasts about 30 minutes.

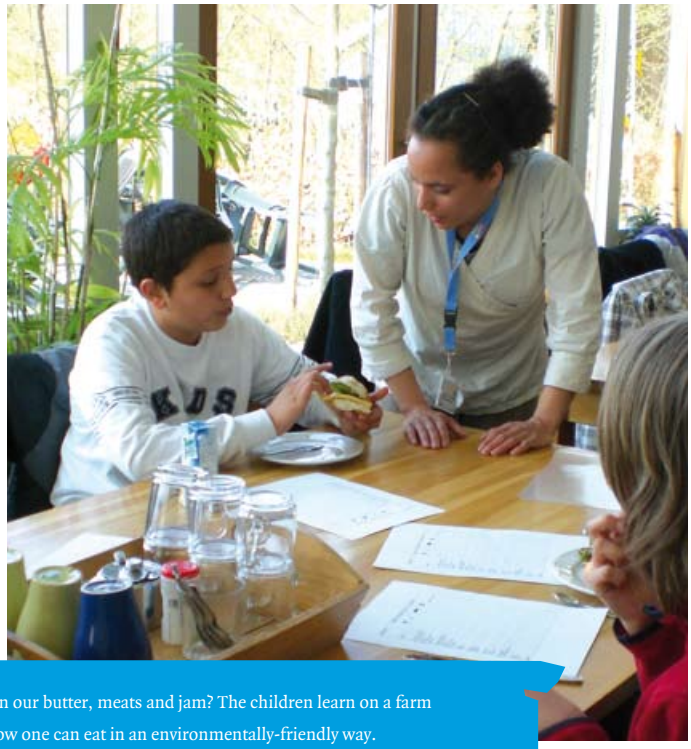
Discussion and assessment: During the breakfast the children are invited to discuss their food choices – whether the products they have chosen are climate-friendly or not, and why that is the case. They are encouraged to take into account whether the products were transported over long or short distances; the amount of packaging used; and whether each product was locally produced or in season. Similarly, they compare industrially produced food with fresh or traditionally preserved food. Session supervisors accompany the children throughout, providing information as well as answering questions.

Objective

By acquiring knowledge and taking a tour of the farm, the children use all five senses in order to learn what organic food production means, how crops are grown, and how animals are kept – those consistent with ecological criteria. They also gain an understanding of the difference between conventional and ecological food production. Indeed, the excursion to the farm - with its tour and "climate breakfast"- is an event of sorts. The children become more aware of farming, food processing and production conditions, and they learn that our daily food consumption involves the consumption of energy for producing, processing, transporting, trading, purchasing and preparing farm products and food.
The children return home with an understanding of how they can reduce the emission of greenhouse gases both through their purchasing choices as well as their climate-friendly nutritional "style".

Subjects

The origin and production of food; the correlation between climate change and nutrition; getting to know ecological farming and animal husbandry, and how this differs from conventional food production.



Where does our food come from? How much energy is contained in our butter, meats and jam? The children learn on a farm how closely connected climate protection and nutrition are, and how one can eat in an environmentally-friendly way.

Creative workshop

Trash it up: How much art is there in trash?

Trash isn't just meant for the rubbish bin! We can use household waste creatively in many ways, even turning it into art. Renowned artists, architects and designers worldwide are showing us how this is done. Old car tires and tarpaulins are being turned into bags; egg cartons and discarded stuff are being turned into sculptures and designer artefacts. Together with two artists, we take a critical look at the growing waste heaps generated by our consumer society and consider how each of us can avoid waste. At the same time, the session initiates a creative waste workshop.

Duration: Four hours
Educators: Independent artists and art teachers

Method: Creative workshop with introductory lecture and quiz

Introduction: A brief introductory lecture (30 minutes), consisting of a presentation as well as quiz elements, provides information on the history of waste within the context of industrial development. When did notions of waste and/or packaging waste become an issue? What is the correlation between energy consumption, wasted energy and resources? Explanations of key terms such as waste, reuse, recycling, up-cycling, etc. are provided.

Following this, the artists present works by renowned architects, designers and artists from all over the world who have made packaging waste and rubbish the subject of their work. These original works and objects d'art provide the point of departure as well as the basis for the subsequent three-hour creative workshop.

Creative workshop: The children are given the opportunity to work in a spacious, well-equipped room with materials collected at home especially for this purpose – i.e., packaging waste, fabric, wood, dolls, toys, etc. Not only do the art tutors provide additional material, but they encourage the children to use as much of the diverse material as possible. The children work alone or in groups; they use materials "creatively" while dealing with the issue of "recycling". They are able to let their imagination run free.

This session is unusual for the children in two ways: a) the multitude of materials made available and b) the large range of tools they can use, including saws, drills, hammers, hot-melt adhesive, sewing machines, pliers and other tools.

Reflection: At the end of the workshop, the children present their sculptures and creations. These are documented with names as well as intentions. Photographs are taken of all objects and their creators; the children are permitted to take the works home with them if they wish.

Objective

This combination of teaching and artistic activity allows the children to reflect upon the consumer society in which they live and upon the depletion of natural resources - and, therewith, the squandering and destruction of valuable natural (energy) resources.

The possibilities for recycling and up-cycling are demonstrated through the practical and creative re-use of packaging waste to make art, as well as through discussions with the art tutors. Further, the children are encouraged to develop their own solutions to the waste problem, i.a. avoiding excessive packaging waste.

By working with tools and discussing issues with artists, children are given the opportunity to reconsider their own lives and lifestyles as consumers, and discover their own creativity. For children from socially disadvantaged families in particular, this session often presents the first opportunity to work with tools or engage in direct contact with artists.

Trash = Art! The children create sculptures and objects from household trash they have brought along. During the creative process they learn that energy consumption and production of packaging materials are connected. They experience that one can have fun by creating art and unusual objects without spending a lot of money.

Subject

Packaging materials and climate-related impacts; the correlation between consumption and climate change; conserving resources through environmentally conscious shopping, waste separation and recycling.

Hands-on workshop

Show me your feet! The ecological footprint

Did you know that your lifestyle and energy consumption can be measured in terms of an "ecological footprint"? You can calculate an ecological footprint using data on energy consumption in your school or home. What information can you glean from this?
We compare the ecological footprints of several cities and regions in Latvia with those of other cities and countries; and together we try to find ways to reduce the footprints of children's homes and schools by changing behaviour and thus contributing to climate protection.

Duration: One-and-a-half hours
Educators: Scientists of the Department of Economy and Management, University of Latvia.

Method: Interactive acquisition of knowledge on the concept of the ecological footprint, with quiz elements.

Introduction: By conducting a fun quiz, the lecturer explains what exactly is meant by the term "ecological footprint". It involves a method which allows for the calculation of the amount of space on earth that would be necessary to support a certain lifestyle and standard of living for every individual, including the volumes necessary for the production of food and clothing, and for energy generation. The resulting "carbon footprint" can then be used to demonstrate the differences in the consumption of raw materials and energy (i.e., the various "footprints") that exist between countries and/or regions.

Hands-on activity: Prior to this activity, children and teachers are asked to gather information about the energy consumption (electricity, gas, water) of their school and homes, and to bring this data with them. Following the introductory session, the children feed the data into a computer. The ecological footprint of their school is calculated; thereafter, the children learn how to transmit this data to their own personal consumption. During the workshop they calculate the ecological footprint of their families and friends

Discussion: On the basis of the results produced, the children discuss the concept of the "ecological footprint", as well as solutions for reducing the footprints of their homes and school. What feasible alternatives are there, in terms of a climate-friendly and resource-conserving nutrition or mobility? What can each individual do to protect the environment?

Reflection: The children discuss the question of how they can make their families and friends aware of the concept of "ecological footprints", and how they can persuade them to adopt a more climate-friendly way of life.

Objective

The objective of this workshop is to give children an introduction to the basis for calculating an ecological footprint, allowing them to determine if and to what extent their lifestyle is sustainable, and to find out how they can improve this through changes in their day-to-day behaviour – those which include modest initiatives regarding nutrition, mobility and consumption.

Subjects

Causes and effects of climate change; the correlation between climate change and lifestyle; potential actions everyone can take.

How many planets would we need if all people on earth would live like us in Latvia? The ecological footprint is the total of all the land (i.e. farmland, forest, meadows, industrial premises) that a person uses with their way of life. A footprint can also be calculated for cities and countries.

Creative workshop

Become an architect for a day: Build a "green" building

What does a "green" building look like? What has to be taken into account when designing one? How can we build attractive houses that consume as little energy as possible and use the power of the sun? This session examines and develops architectural solutions and considers how we can optimise the use of solar energy to meet domestic energy demand.

In small groups of four to six children we assume the role of architects and design an energy-efficient and environmentally friendly house, one surrounded by greenery. What design can you come up with?

Duration: Three hours
Educators: Scientists and architecture students at Aalborg University.

Method: Creative workshop, working with architectural models.

Introduction: The architects deliver a lecture briefly explaining the causes and effects of climate change. Thereafter, they present various solutions for sustainable building and the energy-efficient construction of residential buildings and communities using solar power for heating and hot water. The children are briefed on the information that should be taken into account in designing solar installations (e.g., the orientation of the building facing southward).

Creative workshop: The children are divided into groups of four or five. They are presented with the task of designing a community that includes buildings reliant on the use of solar power. These, however, need to meet certain expectations in terms of living comforts. To produce the necessary models they are provided with cardboard boxes of various sizes as well as the materials typically used by architects to produce dummies or "maquettes" (e.g., miniature trees and bushes, figurines, moss and glue).

The lecturers provide advice as well as construction tips and directions: Where are the compass points? How can rooms be designed to maximise available daylight? Where is the sun in the afternoon? How can we bring more greenery into the town? Where can you ride your bicycle? How long is the route to school?

The children discuss these aspects and collectively build a maquette, including outdoor facilities. Architecture students are on hand to mediate in the event the children cannot agree on certain design solutions (thus providing an opportunity for the students to gain professional and teaching experience).

Presentation of results: Each group presents its results, outlining the reasons for their particular architectural solution. Every maquette is photographed together with the children who created it. At the end of the session, various conclusions are collectively drawn about the results of the work.

Objective

The objective of this workshop is to allow children to gain an understanding of the criteria for energy-efficient construction and sustainable building – particularly regarding the use of solar power. While designing their houses the children also have the opportunity to use and further develop their own creative and cooperative abilities. In an engaging, playful way, the children learn that renewable energies are a realistic and attractive possibility in the design of attractive and functional houses and communities, consistent with ecological criteria and at a reasonable cost.

Subjects

Causes and effects of climate change; energy-efficient building; criteria for sustainable architecture and urban planning; opportunities relating to renewable energies in architecture and construction.

With the power of the sun and many ideas!
The children implement their vision of green living.

Additional ideas from the SAUCE programmes

Lecture
Recycling fashion - The long life of a pair of jeans
Twente of University
Subjects: Connection between clothes production and climate change, sustainable consumption and lifestyle

How much energy is contained in your jeans and to what extent can the choice of clothes contribute to climate protection? In this lecture an expert in textile recycling reports about the lifecycle of our clothes and the connection and influence of textile and clothing production on the climate and the environment.

Games workshop
How does climate change influence our forests?
University of Latvia
Subjects: Connection between climate change and the loss of biodiversity; everyday climate protection

By engaging in games the children learn about the impacts of climate change on the domestic forests. Is the impact visible already? How do the trees, coniferous forests and wild animals respond? Are there actions that can be taken to contain climate change and preserve the forests‘ ecosystems? Teams playing a board game develop solutions for contributing to the protection of our forests.

Experimental workshop
Build a wind turbine with lots of action!
Freie Universität Berlin
Subjects: Functioning and effect of wind power

A windmill-competition awaits you! Small groups work together in building a model wind-turbine from recycled cardboard and plastic. In the workshop you learn how wind turbines work; in the team you get engineering practice and find out why renewable energy resources can stop climate change. You will have fun at the wind tunnel: there you will be able to test the efficiency of your turbine

Hands-on workshop
Why I am a climate-champion
London Metropolitan University
Subjects: Causes and consequences of climate change

Sixteen-year-old Louise reports from her expedition to the Arctic – specifically about the lives of the Inuit and how climate change threatens the area where they live. 28 young people from various countries participated in the arts and science project. Join us on this exciting trip.

Hands-on workshop
The power of the solar creatures
Vienna University of Technology
Subjects: Fossil and renewable energy resources

The short films “Freunde der Sonne” (Friends of the sun) and “Freunde der Schatten” (friends of the shadows) provide the children with information on renewable and fossil energy resources. A lively quiz will reveal who paid attention best and the children can apply their knowledge

Interactive lecture
What are climate-killers and how do they change our climate?
London Metropolitan University
Subjects: Causes and consequences of climate change

Experience the fascination of chemistry and experience a knowledge-show in which experiments demonstrate the physical functioning of the greenhouse effect and which gases contribute to global warming. Learn about the gas CO_2. Find out why it turns the oceans acidic and which positive and negative impacts the gas has on the environment.

Hands-on workshop

How do you generate electricity from sunshine and wind?

Vienna University of Technology
Subjects: Renewable energies

How can we use the sun, wind, biomass and water for generating electricity and heat? In a funny "1, 2 or 3?"-quiz you have to find the correct answers hidden in the information.

Hands-on workshop

Climate change in Denmark?

Roskilde University
Subjects: Causes and consequences of climate change

How does the climate change influence temperature, rain and water levels? Which substances are climate killers and how does the greenhouse effect work? Scientists show you how things are interconnected and what impact the climate change has in Denmark.

Creative writing

Write it down: A different approach to waste separation and climate protection

Freie Universität Berlin
Subjects: Conservation of resources and separation of waste, climate protection in everyday life

Come with us and discover the world of writing! In a dialogue, with images to give impulses and associations waste separation and climate protection become easy as pie. Creative writing opens secret doors and lets you discover your ideas; join and find out to which worlds you are taken by your curiosity and joy of writing. In what way will you perhaps change your everyday behaviour?

Interactive lecture

What is energy? Can energy be renewed?

University Roskilde
Subjects: Renewable energies

What does the term of "renewable energies" mean? What are renewable resources? How can chicken slurry be turned into electricity and heat? Here you learn what the term '"renewable energies" means and how it can be used in a sustainable way.

Activity workshop

Experimenting with energy

Aalborg University
Subjects: Experience energy in a playful way

By playing, experimenting and setting off a minor explosion in a thrilling chemistry and knowledge show, students explain what energy is and how it can be generated. The Children experiment with solar energy and find out what the term "energy" means.

Information is available
www.schools-at-university.eu

Selected links

Below you will find contact information (compiled by the participating universities and listed by partner country) of the most important local and national project partners as well as sources of further information for teachers.

Austria

IG Windkraft - Kinderprojekt "Die Erneuerbaren"
www.igwindkraft.at/kinder

FORUM Umweltbildung - Carbon Detectives
www.carbondetectives.at, www.umweltbildung.at

Klimabündnis Österreich
www.klimabuendnis.at

Die Umweltberatung - Kompetenzzentrum für Umweltbildung
www.umweltbildung.umweltberatung.at

Die Umweltchecker - Nachhaltigkeit für die 2. bis 6. Schulstufe
www.umweltchecker.at

Denmark

Skoletjenesten (Aalborg Kommune)
www.skoletjenesten.daks.dk

NTS-center Nordjylland
www.nts-centeret.dk

EMU – Danmarks Undervisningsportal
www.ubu.emu.dk

Energitjenesten
www.energitjenesten.dk

Skolernes Energiforum
www.skoleenergi.dk

Bjørnvig/relations
www.bjoernvig.com

Det mobile Science center i København –
en selvforsynende by på vedvarende energi
www.mobilesciencecenter.dk

Green Kids
www.green-kids.dk

Germany

Bildungsservice des Bundesministerium für Umwelt,
Naturschutz und Reaktorsicherheit
www.bmu.de/bildungsservice

Bildungswiki "Klimawandel" des Hamburger Bildungsservers
www.wiki.bildungsserver.de/klimawandel

Unabhängiges Institut für Umweltfragen
www.ufu.de

Umweltbüro Nord e.V.
www.umweltschulen.de

Great Britain

ActionAid
www.powerdown.actionaid.org.uk

Cape Farewell - Education
www.capefarewell.com/education

Centre for Alternative Technology
www.cat.org.uk

EPSRC (Engineering and Physical Sciences Research Council)
University College London
Dr Andrea Sella, EPSRC Senior Media Fellow
www.ucl.ac.uk/cheltenhamblog/tag/andrea-sella

Seed - Sustainability and Environmental Education
www.se-ed.co.uk

Latvia

Institute of Solid State Physics, University of Latvia
www.cfi.lv

Institute of Physical Energetics
www.innovation.lv/fei

Ministry of Education and Science - Centre for Curriculum Development
www.visc.gov.lv

Vides Labirints (Environmental Labirinth)
www.aluksne.lv/videslabirints

Netherlands

Ecocschools
www.eco-schools.nl

Natuurlijk duurzaam
www.natuurlijkduurzaam.nl

Natuur en Milieueducatie van de Gemeente Enschede
www.enschede.nl/toerisme/natuureducatie

The following projects under the European Intelligent Energy Europe Programme provide more hints, information and background for teaching young audiences about energy and climate change:
www.iuses.eu | www.myfriendboo.com | www.flicktheswitch.eu | www.kids4future.eu
www.energyunion.eu | www.rainmaikers-eu.eu | www.learn-energy.net/education

Pimp it up!
SAUCE artfully beads household trash.

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About SAUCE – Schools at University for Climate and Energy

For the European project SAUCE, energy policy researchers from seven European universities and the Berlin Energy Agency joined forces. From 2008 until 2011, they developed and promoted university programmes for schools as an innovative educational tool aiming to make younger generations aware of sustainable energy solutions and adopt intelligent energy behaviour. In an exiting new learning environment the programmes address pupils, teachers, researchers and educators and facilitate the exchange of ideas, knowledge and experience in the local community.

This publication presents a selection of the SAUCE workshops and lectures. A second publication, the SAUCE handbook, compiles the essentials from our partners' experiences in developing and organising SAUCE programmes.
SAUCE is supported by the European programme Intelligent Energy Europe. This programme aims to promote energy efficiency and renewable energy sources. It helps all of us to produce and use energy in more intelligent ways and to increase the use of renewables.

For more information visit: www.schools-at-university.eu

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